VALUE and EMPLOYMENT

associated with

PACIFIC NORTHWEST LOG EXPORTS to JAPAN

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CONTENTS

INTRODUCTION

With the rise in log exports from the United States to Japan in recent years, there has been considerable discussion of the impact of these exports on the economy of the Pacific Northwest. One of the many questions raised concerns the comparative amounts of value and employment generated per unit of logs by export in contrast to primary manufacture in domestic mills. The objective of this study is to provide information on this question by determining value and employment generated per thousand board feet in exports and in domestic manufacture for the specific kinds of logs actually exported in the fourth quarter of 1964. Also included are data on species, grade, and size of logs exported during this period.

The study was based on a sample of log exports from seven of the principal ports in western Washington and western Oregon currently exporting logs to Japan. Detailed sampling procedures are described in "Appendix A."

Log export values and employment data were collected from exporting firms, towboat companies, stevedoring firms, steamship companies, and port authorities. Corresponding value data for domestic processing of logs were estimated from price information used in National Forest timber appraisals. Employment requirements for primary log manufacturing were determined from data on file at the Pacific Northwest Forest and Range Experiment Station.

SPECIES, GRADE, AND SIZE OF LOG EXPORTS

Western hemlock was principal
export species

As indicated in the tabulation on the next page, western hemlock made up 53.6 percent of the logs exported to Japan during the fourth quarter of 1964. White and noble firs made up 22.8 percent; Douglas-fir, 9.4 percent; and other species, 14.2 percent.[1]

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[1] The sample volume represents total fourth quarter 1964 log exports of seven exporting firms located at seven different ports.

	Volume, Scribner log scale	
	(Board feet)	(Percent)
Douglas-fir	2,179,640	9.4
Western hemlock	12,427,290	53.6
White firs	2,915,640	12.6
Noble fir	2,369,080	10.2
Sitka spruce	268,120	1.2
Western white pine	130,180	.6
Port-Orford-cedar	2,073,530	8.9
Alaska-cedar	370,180	1.6
Western redcedar	132,480	.6
Mixed species	311,350	1.3
Total	23,177,490	100.0

Forty-six percent of log exports were No. 2 sawmill grade

Grade information was available for approximately 19 million board feet of the sample of exported logs. Of this volume, 46.3 percent were No. 2 sawmill logs, 13.3 percent were No. 3, and 31.1 percent were listed as No. 3 and better. Peelers made up only 3.6 percent, of which none were Douglas-fir. The complete grade distribution was as follows:

Domestic log grade[1]	Volume, Scribner log scale	
	(Board feet)	(Percent)
Peeler or select	688,860	3.6
Special mill	416,680	2.2
No. 1	657,690	3.5
No. 2	8,793,170	46.3
No. 3	2,533,540	13.3
No. 3 and better	5,906,650	31.1
Total	18,996,590	100.0

[1] According to Official Log Scaling and Grading Rules for Puget Sound, Grays Harbor, Columbia River, and Southern Oregon Log Scaling and Grading Bureaus.

<u>Most volume was in logs 14 to</u>
<u>25 inches in diameter</u>

In terms of log numbers, over three-quarters of the sample of exported logs had small-end diameters ranging from 11 to 22 inches (table 1). In terms of log volume, about two-thirds of the exported logs had diameters ranging from 14 to 25 inches. Very few logs in the sample had diameters of 10 inches or less.

Table 1.--<u>Number and volume of logs in a sample of exports to Japan,</u>

<u>October through December 1964, by diameter classes</u>

Diameter class (inches)	Logs in sample		Volume, Scribner log scale	
	Number	Percent	M board feet	Percent
8-10	165	7.2	17,420	1.8
11-13	478	20.8	77,840	8.0
14-16	587	25.5	166,180	17.2
17-19	439	19.1	185,860	19.2
20-22	249	10.8	150,790	15.6
23-25	158	6.9	118,390	12.2
26-28	77	3.4	73,520	7.6
29-31	64	2.8	71,930	7.4
32-34	33	1.4	38,860	4.0
35+	49	2.1	67,450	7.0
Total	2,299	100.0	968,240	100.0

VALUE OF EXPORTED LOGS

Figure 1 shows the major components of total value in the log exporting and domestic processing markets. The costs of stumpage, logging, transportation, scaling, and unloading, plus a margin for profit and risk, were considered to be equal in each use. The average value of the logs after these functions were performed was $53.80 per thousand board feet.

<u>Average log export value, free</u>
<u>alongside ship, was $73.35</u>
<u>per thousand board feet</u>

The weighted-average value, free alongside ship (f.a.s.), for the sample of export logs was $73.35 per thousand board feet (table 2). The

AVERAGE VALUE
OF LOGS
PER
M BOARD FEET

LOG
EXPORTING

DOMESTIC
PROCESSING

99.70 — Port Charges
97.11 — Ship-handling Costs
95.66

Loading Costs

73.35 — Cost of Sorting,
Trimming, Rescaling,
Towing, Storage, and
Profit from
log transactions

95.24 — Manufacturing
Profit and Risk
91.13

Manufacturing
Costs

$ 80.00

60.00

40.00

20.00

0

53.80
Cost of Stumpage,
Logging, Transportation,
Scaling, Unloading
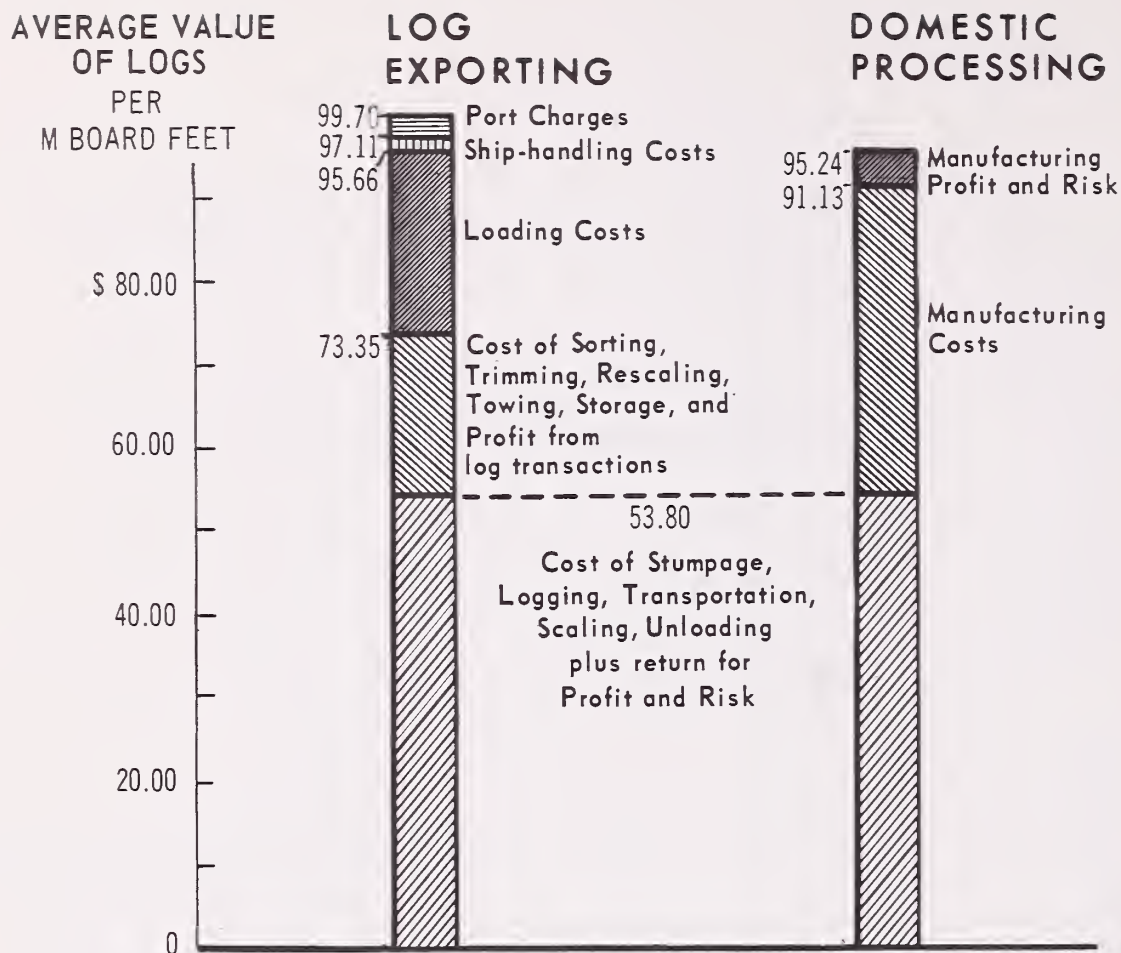plus return for
Profit and Risk

Figure 1.--Value of the export log sample in alternative log markets,
Washington and Oregon, October to December 1964.

variation in value among ports was chiefly due to differences in log species, grades, and sizes. In addition, varying amounts of log-processing functions were performed. [2]

Log loading represents the
largest cost item

The cost of loading ships represents the largest single addition to f. a. s. log values. The magnitude of these costs varies substantially, depending mainly on the type of ship and the kind of loading equipment used. Special, log-carrying ships, with large hatches and open holds, have considerably lower costs than other types of ships (table 3).

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[2] An explanation of log processing and other terms is given in "Appendix B."

Table 2.--Volume and value, free alongside vessel (f.a.s.), of

sampled log exports to Japan from Washington and

Oregon ports, October through December 1964

Port	Log volume	F.a.s. value	
		Total	Average per M bd.ft.[1]
	Board feet[1]	Dollars	Dollars
A	149,880	10,272.66	68.54
B	160,840	10,753.76	66.86
C	236,480	21,151.08	89.44
D	79,180	5,943.47	75.06
E	123,410	8,446.48	68.44
F	187,990	12,219.35	65.00
Total	937,780	68,786.80	73.35

[1] Scribner log scale.

Table 3.--Reported costs of loading logs for export, by type

of ship and loading operation, Washington and

Oregon, October through December 1964

(Per thousand board feet, Scribner log scale)

Type of operation	Loading costs		
	Low	High	Average
	--------------- Dollars -------------		
Special log ship:			
Large cranes	12.14	17.47	14.99
Ship's gear	14.58	19.24	17.74
Other ship:			
Large cranes	17.06	22.27	18.77
Ship's gear	21.83	32.07	25.08
All loading operations[1]	--	--	22.30

[1] Average of all firms reporting, including those that did not show a breakdown.

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In table 3, "all loading operations" represents the average loading costs for the entire operation of several firms. Although a wide range was found, most costs tended to be nearer those in the "low" column and averaged $22.30 per thousand board feet of logs.

The data in table 3 show that the use of special log ships is a more important factor in reducing loading costs than is the use of large cranes. Even when ship's gear is used, the cost of loading special log ships is less than that incurred when cranes are used to load ships not built specifically for log transportation.

Ship-handling costs are highly variable but relatively low

Like the cost of loading, the expense of moving ships in and out of port is highly variable; however, this expense is much smaller, ranging from $0.88 to $2.12 per thousand board feet, Scribner log scale (table 4). The range of costs between individual ships may be even greater than is shown here, since these figures represent averages for entire business operations.

Table 4.--Reported costs of handling log ships, Washington

and Oregon, October through December 1964

(Per thousand board feet, Scribner log scale)

Type of cost	Handling costs		
	Low	High	Average
	---------------- Dollars ----------------		
Pilotage	0.24	0.38	0.30
Customs tax	.19	.23	.21
Other customs fees	.04	.04	.04
U.S. Immigration, Public Health, and Plant Quarantine	.02	.06	.04
National Cargo Bureau	.06	.06	.06
Line handling	.08	.13	.09
Towage	.17	.41	.26
Total	.80	1.31	1.00
Miscellaneous costs	.08	.81	.45
All costs	.88	2.12	1.45

Port charges average $2.59 per thousand board feet

Port charges include wharfage, dockage, and service charges. These may be fixed per ton, per thousand board feet, or per time period. They differ, depending on whether logs are loaded from the water or from the dock, as follows:

	Loaded from water	Loaded from dock	Average
	(Per M board feet, Scribner log scale)		
Wharfage	$0.75	$1.50	$1.13
Dockage	.60	.60	.60
Service charge	.39	1.33	.86
Handling charge[1]	--	3.57	--
Total	1.74	7.00	2.59

[1] In addition to other costs, there may be a charge for cargo handled by the port, if loaded from the dock. This handling charge is included in the f.a.s. values.

Average export value on board ship was $99.70 per thousand board feet

The average value of the log export sample, loaded aboard ship, was $99.70 per thousand board feet, Scribner rule (table 5). Average values at individual ports ranged from $91.64 at port F to $114.52 at port C.[3]

Average manufacturing cost calculated as $37.33 per thousand board feet

Forest Service timber appraisal methods were used to calculate an average manufacturing cost of $37.33 per thousand board feet and a margin for profit and risk of $4.11 for the logs in the sample (fig. 1). These costs are based on the primary lumber, plywood, and chip products, f.o.b. mill, that could be recovered if the logs were processed domestically.

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[3] Data from a seventh port in the sample, Coos Bay, is omitted from this section because the sample from this port was composed entirely of Port-Orford-cedar, a species with unusually high export value and one not shipped from any other port.

Table 5.--Value of the export log sample in alternative log
markets, Washington and Oregon, October through
December 1964, by sampled ports

Port	Log volume	Value in log export		Value in domestic manufacture[1]	
		Total	Average per M bd. ft.[2]	Total	Average per M bd. ft.[2]
	Board feet[2]	Dollars	Dollars	Dollars	Dollars
A	149,880	14,318.24	95.53	14,344.78	95.71
B	160,840	14,991.32	93.21	14,554.71	90.49
C	236,480	27,082.39	114.52	24,352.76	102.98
D	79,180	7,945.46	100.35	7,418.17	93.69
E	123,410	11,929.42	96.66	11,160.87	90.44
F	187,990	17,227.10	91.64	17,478.68	92.98
Total and average	937,780	93,493.93	99.70	89,309.97	95.24

[1] Imputed log value calculated from wholesale prices of primary manufactured products, f.o.b. mill. It does not reflect the extra value of special items and remanufactured products.

[2] Scribner log scale.

Sample logs valued slightly
higher for export

The average value of products that could be obtained by domestically processing the log export sample was $95.24 per thousand board feet (table 5).[4] This figure was slightly lower than the value attained for these logs in the export market. However, in two cases, ports A and F, domestic processing shows a greater value.

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[4] Value in domestic manufacture was determined by applying end-product selling values used in Region 6 National Forest timber appraisals. The method of determination is shown in "Appendix A."

EMPLOYMENT IN LOG EXPORTING AND
DOMESTIC PROCESSING

Figure 2 shows the man-hours required per thousand board feet of logs in the log-exporting and the domestic-processing markets. Employment for logging and log transportation is the same for both markets, amounting to 4.46 man-hours per thousand board feet.
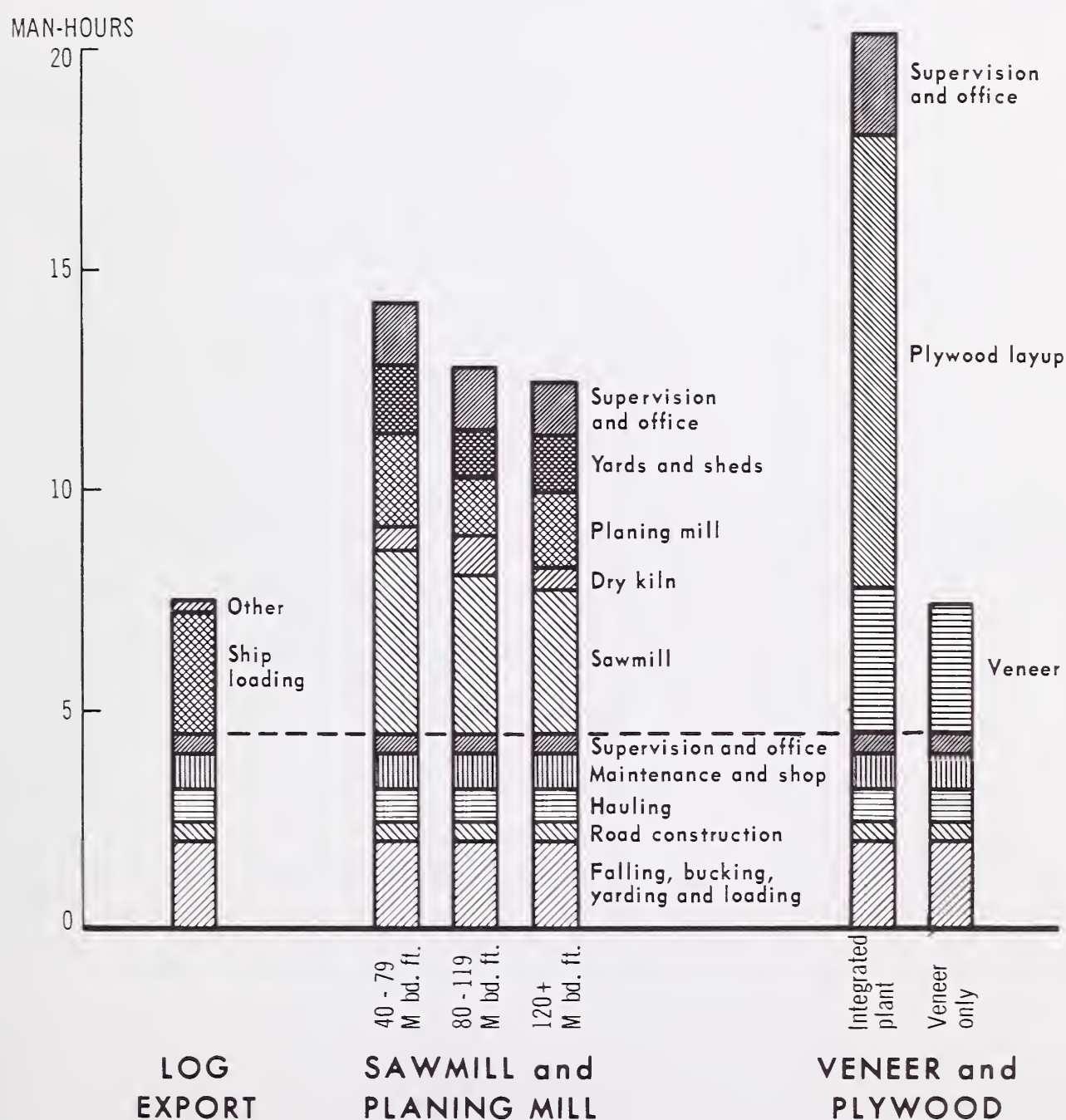

Figure 2.-- Employment per thousand board feet of logs in log exporting and domestic log manufacturing.

Log exporting requires 3.01 man-hours
per thousand board feet

Average employment requirements for log exports were 3.01 man-hours per thousand board feet of logs. Since log-exporting functions are generally performed by a number of different firms, this figure is based on an estimate of each firm's employment contribution.

The average employment requirement for all kinds of log-loading operations was 2.76 man-hours per thousand board feet (table 6). The use of special log-carrying ships and large shore-based or floating cranes has materially lowered the amount of labor needed to load logs for export.

On a per-thousand-board-foot basis, only a small amount of employment was required for the exporting functions of buying and selling, log preparation, extra scaling, rafting and towing, port operation, ship handling, and shipping agents' services. Although it was difficult to measure the labor requirements for these activities, their contribution to total employment was estimated at 31 man-days per million board feet, or 0.25 man-hour per thousand board feet.

Table 6.--Man-hours required per thousand board feet, Scribner
log scale, in loading logs for export, by type of
ship and loading operation, Washington and Oregon,
October through December 1964

Type of operation	Low	High	Average
Special log ship:			
Large cranes	1.11	3.38	2.03
Ship's gear	1.65	3.76	2.56
Other ships:			
Large cranes	1.88	4.47	2.69
Ship's gear	2.35	6.58	3.76
All types (average)	1.75	4.55	2.76

More employment associated
with domestic manufacture

The average labor requirements for log exporting were compared with those for domestic manufacturing in western Washington and western Oregon sawmills and plywood plants, as developed from a recent Forest Service study.[5]

Employment requirements for domestic lumber manufacture ranged from 8.01 to 9.76 man-hours per thousand board feet of logs (table 7, fig. 2). These were well above the 3.01 man-hours per thousand board feet in log exporting.

The above employment requirements for domestic lumber manufacture are for surfaced, kiln-dried lumber. However, some mills produce only surfaced, green lumber; employment requirements in these mills would be somewhat less in all functions except the sawmill itself.

Table 7.--Man-hours required per thousand board feet, Scribner

log scale, in domestic lumber manufacture, western

Washington and western Oregon

Function	Sawmill-size class[1]		
	40-79	80-119	120 and over
Sawmill	4.16	3.58	3.00
Dry kiln	.56	.91	.80
Planing mill	2.12	1.30	1.69
Yards and sheds	1.50	1.08	1.31
Supervision and office	1.42	1.41	1.21
Total	9.76	8.28	8.01

[1] Thousand board feet per 8-hour shift.

[5] Smith, Richard C. Manpower requirements in the wood-products industries of Oregon and Washington, 1950-63. (In preparation for publication, Pac. NW. Forest & Range Expt. Sta., U.S. Forest Serv.)

Employment requirements in plywood manufacture were:

	Man-hours per M board feet, Scribner log scale
Integrated plants:	
Veneer production	3.35
Plywood layup	10.21
Supervision and office	2.29
Total	15.85
Veneer plants	2.94

Employment requirements for integrated plywood plants were several times those for log exporting. However, employment in nonintegrated veneer plants was slightly less than in log exporting.

APPENDIX A

Source of data for the export market

The information in this report was obtained from log scaling records for a sample of logs actually exported during the period October through December 1964.

A stratified random sample of 7 ports, 4 in Washington and 3 in Oregon, was chosen from the 14 principal ports currently exporting logs to Japan from the two States. One shipper was chosen at random from each of these ports, from whom records of log volume by species and grade were obtained for their entire October through December 1964 exports to Japan. In addition, species, grade, diameter, and f.a.s. log values were obtained from each shipper for a smaller sample of 100 to 500 export logs.

Loading costs, port charges, ship-handling costs, and employment requirements were obtained from towboat companies, stevedoring firms, steamship companies, exporters, and port authorities. The data from these sources were aggregated to determine average costs and employment in log exporting.

Determination of value in domestic processing

Value in domestic manufacture was determined by applying primary-product selling values used in National Forest timber appraisals. These values are for lumber, plywood, and chip use, depending on how each species, grade, and size of log would be classified in the appraisal.

Table 8 shows this method of value determination, using No. 2 western hemlock logs as an example. The imputed value of the logs in this sample was $89.46 per thousand board feet, log scale. A similar calculation was made for all species and grades of logs in the export sample, and the results were aggregated to obtain an average domestic value for the entire sample volume.

Table 8.--_Imputed value of a sample of No. 2 hemlock logs in domestic manufacture,_

by log diameter and volume

Log diameter (inches)	Board-foot volume [1]	1963 primary-product selling value, per M board feet [1]	Total 1963 selling value	Adjustment to 1964 3rd qtr. price [2]	Value of chippable residue at $4.69 per M board feet [1]	Total log value	Average log value per M board feet [1]
			-- Dollars --				
14-16	13,600	84.00	1,142.40	1,159.54	63.78	1,223.32	89.95
17-19	18,580	84.00	1,560.72	1,584.13	87.14	1,671.27	89.95
20-22	11,980	84.00	1,006.32	1,021.41	56.19	1,077.60	89.95
23-25	10,470	82.00	858.54	871.42	49.10	920.52	87.92
26-28	1,030	82.00	84.46	85.73	4.83	90.56	87.92
29-31	1,560	81.00	126.36	128.26	7.32	135.58	86.91
Total	57,220	--	4,778.80	4,850.49	268.36	5,118.85	89.46

Source: Product values and adjustment factor taken from Region 6 U.S. Forest Service Handbook on Timber Appraisal (FSH2 chapter 2425-R6).

[1]/ Scribner log scale.

[2]/ By factor of 1.015.

APPENDIX B

<u>Definition of terms</u>

<u>Log-processing costs</u>-- include all expenditures for sorting, scaling, towing, bucking, and trimming logs in preparation for their export. These charges are included in the f.a.s. value of the logs.

<u>Loading costs</u>-- include (1) wages of supercargo and (2) stevedoring, including wages, overtime and vacation pay, payroll taxes, health benefits, accident insurance, crew transportation, portable winches, crane rental, and services of a work boat in the water.

<u>Port charges</u>-- include all payments to the ports for wharfage, service charges, and dockage.

<u>Ship-handling costs</u>-- include (1) the expenses incurred in moving the ship into and out of the port and (2) dollar payments for maintenance of the ship and crew while in port and supplies for the return voyage.

<u>Wharfage</u>-- is the charge by the port for use of its cargo-holding facilities.

<u>Handling charge</u>--is the charge levied by the port authority for handling the cargo on the dock.

<u>Service charge</u>--is the charge for use of port services such as lighting and personnel services.

<u>Dockage</u>--is the charge for the ship's berth.

<u>Special log ship</u>--is a ship built specifically for log transportation.

<u>Other ships</u>--are ships intended for transporting general cargo.

<u>Pilotage</u>--is the charge for guiding a ship in or out of port.

<u>Customs tax</u>--is the charge for a ship's clearance and entry into the country.

<u>Customs fee</u>-- is the payment for services of a customs broker who assesses the tax.

<u>U.S. Immigration, Public Health, and Plant Quarantine charge</u>--is the charge for these inspections; a charge is made for overtime work only.

National Cargo Bureau--is a Government agency which determines
   whether cargo is loaded properly to insure safety and stability.

Line-handling charge--is the charge for services of mooring the ship
   to the dock and casting off.

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cooperation with the States and private
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the National Forests and National
Grasslands, it strives — as directed
by Congress — to provide increasingly
greater service to a growing Nation.

Adams, Thomas C., and Hamilton, Thomas E.
1965. Value and employment associated with Pacific
Northwest log exports to Japan. U.S. Forest
Serv. Res. Paper PNW-27, 15 pp., illus.
Pacific Northwest Forest & Range Experiment
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